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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/789,940 | 02/27/2004 | Osamu Shinkawa | 9319S-000656 | 6778 |

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| EXAMINER |
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LEBRON, JANNELLE M

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| ART UNIT | PAPER NUMBER |
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2861

DATE MAILED: 02/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/789,940

Applicant(s)

SHINKAWA ET AL.

Examiner

Jannelle M. Lebron

Art Unit

2861

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 8-11, 13, 14 and 18-20 is/are rejected.
- 7) ☒ Claim(s) 5-7, 12 and 15-17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/2/04, 7/19/04, 2/2/04
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 8-11, 13-14, and 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Kanayama (US Patent 4,498,088).

- **Claim 1:**

Kanayama discloses “a droplet ejecting apparatus comprising:

a droplet ejecting head including:

a vibration plate (20 in figure 1);

an actuator (22 in figure 1 and 2) for displacing the vibration plate;

a cavity (12 in figure 1) filled with a liquid and having an interior pressure to be increased and decreased by a displacement of the vibration plate (column 2, lines 37-46); and

a nozzle (14 in figure 1) communicating with the cavity and for ejecting the liquid as a droplet depending upon an increase and decrease of the pressure within the cavity (column 2, lines 32-36);

a drive circuit for driving the actuator (26 in figure 2); and
an ejection abnormality detecting device (28 in figure 2) having a detecting device (22 in figure 2; column 1, lines 59-63) for detecting residual vibration of the vibration plate displaced by the actuator after the actuator is driven by the drive circuit, to detect an abnormality of droplet ejection depending upon a vibration pattern of the residual vibration of the vibration plate detected by the residual vibration detecting device (column 2, 58-63; column 3, lines 9-14)."

- **Claim 2:**

Kanayama discloses a droplet ejecting apparatus "wherein the ejection abnormality detecting device (28 in figure 2) includes a determining device (22 in figure 2) for determining a presence or absence of a droplet ejection abnormality of the droplet ejection head depending upon the vibration pattern of residual vibration of the vibration plate (column 2, lines 58-63; column 3, lines 9-14)."

- **Claim 3:**

Kanayama discloses a droplet ejecting apparatus "wherein the determining device determines a cause of the ejection abnormality, when the presence of a droplet ejection abnormality is determined (column 3, lines 22-24)."

- **Claim 4:**

Kanayama discloses a droplet ejecting apparatus "wherein the vibration pattern of the residual vibration of the vibration plate includes a period of the residual vibration (column 3, lines 15-22; as seen in figure 3(A))."

- **Claim 8:**

Kanayama discloses a droplet ejecting apparatus "further comprising a storage device for storing a result of the determination made by the determining device (column 4, lines 48-51)."

- **Claim 9:**

Kanayama discloses a droplet ejecting apparatus "further comprising a switch device (30 in figure 2) for switching, after a droplet ejecting operation by the actuator, the actuator from the drive circuit to the ejection abnormality detecting device (column 2, lines 66-68; column 3, lines 42-54)."

- **Claim 10:**

Kanayama discloses a droplet ejecting apparatus "wherein the residual vibration detecting device has an oscillation circuit, the oscillation circuit oscillating based on a capacitance component of the actuator varying depending upon the residual vibration of the vibration plate (column 3, lines 47-52)."

- **Claim 11:**

Kanayama discloses a droplet ejecting apparatus "wherein the oscillation circuit comprises a CR oscillation circuit having a capacitance component of the actuator and a resistance component of a resistance element connected to the actuator (as seen in figure 9)."

- **Claim 13:**

Kanayama discloses a droplet ejecting apparatus "wherein the residual vibration detecting device includes an F/V conversion circuit for generating a voltage waveform of

the residual vibration of the vibration plate from a predetermined signal group generated based on an oscillation frequency change in an output signal of the oscillation circuit (column 3, line 56 – column 4, line 19)."

- **Claim 14:**

Kanayama discloses a droplet ejecting apparatus "wherein the residual vibration detecting device includes a waveform shaping circuit for shaping a voltage waveform of the residual vibration of the vibration plate generated by the F/V conversion circuit into a predetermined waveform (column 3, line 56 – column 4, line 19)."

- **Claim 18:**

Kanayama discloses a droplet ejecting apparatus "wherein the actuator comprises an electrostatic actuator (as seen in figure 2, the actuator is made as a parallel plate capacitor)."

- **Claim 19:**

Kanayama discloses a droplet ejecting apparatus "wherein the actuator comprises a piezoelectric actuator utilizing a piezoelectric effect of a piezoelectric element (column 2, lines 37-46)."

- **Claim 20:**

Kanayama discloses "a droplet ejecting head ejection abnormality detecting/determining method comprising the steps of:

detecting residual vibration of a vibration plate (20 in figure 1) after carrying out an operation for ejecting a liquid within a cavity (12 in figure 1) as a droplet from a nozzle (14 in figure 1) by driving an actuator to vibrate the vibration plate;

detecting a droplet ejection abnormality (column 2, lines 58-63; column 3, lines 9-14); and

determining a cause of the droplet ejection abnormality depending upon a detected vibration pattern of the residual vibration of the vibration plate (column 3, lines 22-24).”

Allowable Subject Matter

3. Claims 5-7, 12, and 15-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. The following is a statement of reasons for the indication of allowable subject matter:

Prior art does not disclose or suggest either alone or combined the claimed “(…)”

- **Claim 5:**

Prior art does not disclose or suggest either alone or combined the claimed “wherein, when the period of the residual vibration of the vibration plate is shorter than a predetermined first period, the determining device determines that the cause of the droplet ejection abnormality is that there is an air bubble mixed in the cavity.”

- **Claim 12:**

Prior art does not disclose or suggest either alone or combined the claimed “wherein the oscillation circuit has an oscillation frequency configured one figure higher than a vibration frequency of the residual vibration of the vibration plate.”

- **Claim 15:**

Prior art does not disclose or suggest either alone or combined the claimed "wherein the waveform shaping circuit includes a DC component removing device for removing a direct-current component from a voltage waveform of the residual vibration of the vibration plate generated by the F/V conversion circuit, and a comparator for comparing between a voltage waveform removed from the direct-current component by the DC component removing device and a predetermined voltage value, the comparator generating and outputting a rectangular wave depending upon the voltage comparison."


5. Claims 6, 7, 16, and 17 are considered allowable subject matter since they depend on allowable claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jannelle M. Lebron whose telephone number is (571) 272-2729. The examiner can normally be reached on Monday thru Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JML
02/03/2006



LAMSON NGUYEN
PRIMARY EXAMINER
02/06/06